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10/698,905	10/31/2003	Wolf-Dietrich Weber	026517-0035P	3004

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/698,905	WEBER, WOLF-DIETRICH
	Examiner	Art Unit	
	JAMES RUTTEN	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>25 July 2008</u>.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>33-62</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>33-61</u> is/are rejected.

7) ☒ Claim(s) <u>62</u> is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>31 October 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
         application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>6/27/05,8/25/05,9/1/05,7/25/08</u>

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

U.S. Patent and Trademark Office

PTOL-326 (Rev. 08-06)   **Office Action Summary**   Part of Paper No./Mail Date 20090310

DETAILED ACTION

1.   A preliminary amendment filed 7/25/08 canceled claims 1-32, and added claims 33-62.

Claims 33-62 have been examined.

Claim Rejections - 35 USC § 101

2.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

3.   Claims 33-34, 37-39, and 47-56 are rejected under 35 U.S.C. 101 because the claimed

invention is directed to non-statutory subject matter. A claim that requires one or more acts to be

performed defines a process. However, not all processes are statutory under 35 U.S.C. § 101. To

be statutory, a claimed process must either: (1) be tied to a particular machine or apparatus, or

(2) transform a particular article into a different state or thing. *In re Bilski*, 545 F.3d 943, 954

(Fed. Cir. 2008) (en banc).

        If the limitations tying the process to a computer are not actually limiting, *i.e.*, they do not

reduce the preemptive footprint of the claim, then the process is not sufficiently tied to a

particular machine or apparatus to be statutory. *Id.* at 955 (citing *Gottschalk v. Benson*, 409 U.S.

63, 71-72 (1972)). Mere field-of-use limitations are generally insufficient to render an otherwise

ineligible process claim patent-eligible. *Id.* at 957 (citing *Diamond v. Diehr*, 450 U.S. 175, 191-

192 (1981)). Nor will insignificant extrasolution activity render such a process statutory. *Id.*

(citing *Diehr*, 450 U.S. at 191-92; *In re Schrader*, 22 F.3d 290, 294 (Fed. Cir. 1994)).

        Regarding transformation of data, the en banc panel in *Bilski* noted that an algorithm (an

unpatentable fundamental principle) merely combined with a data-gathering step was non-

statutory because, "A requirement simply that data inputs be gathered—without specifying

how—is a meaningless limit on a claim to an algorithm because every algorithm inherently

requires the gathering of data inputs," and, "Further, the inherent step of gathering data can also

fairly be characterized as insignificant extra-solution activity." *Id.* at 963 (citing *Parker v. Flook*,

437 U.S. 584, 590 (1978)). Further, transformations of abstractions do not meet the test for

transformation of an article to a different state or thing because, "[Such abstractions] are not

physical objects or substances, and they are not representative of physical objects or substances."

Id. at 963-64.

      For a claimed process to be patent-eligible, the use of a specific machine or

transformation of an article must impose meaningful limits on the claim's scope, and the

involvement of the machine or transformation in the claimed process must not merely be

insignificant extra-solution activity. *Id.* at 961-62.

      Independent claims 33 and 47 are directed to a method. However, the steps involved in

the method may relate to abstract organization of data that are not tied to a particular machine or

apparatus, nor transform a particular article into a different state or thing Therefore, the claim

does not appear to be a proper statutory process under 35 U.S.C. § 101. For example, the

initiator and interconnect of claim 33, and the thread and target of claim 47 are not strictly tied to

an embodiment of hardware and could be interpreted as a software embodiment which is not tied

to a specific machine. Further, any transformation of data is strictly abstract and does not

transform any physical object of substance. Claims 34, 37-39, and 48-56 are dependent upon

claim 33 and 47, respectively, and are rejected for the same reasons.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   Claims 33-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6.   Claim 33 recites the limitation "the request that has been serviced" in line 6. There is insufficient antecedent basis for this limitation in the claim. For the purpose of further examination, this limitation will be interpreted as "the request."

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.   Claims 33, 34, and 37-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over prior art of record US 2002/0138687 A1 by Yang et al. ("Yang") in view of U.S. Patent No. 6,105,094 to Lindeman ("Lindeman") and prior art of record "Service Disciplines for Guaranteed Performance Service in Packet-Switching Networks" by Zhang ("Zhang").

In regard to claim 33, Yang discloses:

A method for satisfying a Quality of Service (QoS) contract with an initiator, See paragraph [0009], i.e. "method for controlling a memory device…" *comprising:*

receiving a request from an initiator See paragraph [0025], i.e. " Although each MCU resides in one particular processor, it will respond to memory requests from any processor connected to the same system interface so long as the request's address is mapped by the memory controller."

in a first time less than or equal to an ordinal number times an arrival interval to satisfy an arrival model, wherein the ordinal number signifies a position of the request among a group of requests; See Figure 2, element 203 "Rqst Queues." It is noted that Yang's queue is arranged in an ordinal manner. Yang does not expressly disclose: arrival intervals or arrival models. However, Lindeman teaches data which arrives in an isochronous fashion. Lindeman teaches that such data must be available at regular intervals. See Lindeman column 6 lines 30-38. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Yang's queue with Lindeman's teaching of regular intervals in order to insure that data is not lost as suggested by Lindeman.

returning the request [that has been serviced] to the initiator See paragraph [0023], i.e. "For a memory read, data are transferred on data bus 109 from SDRAM to the MCU." The MCU transfers the data to the processor at least as described in paragraph [0002]. Note that this limitation has been interpreted in view of the above 35 U.S.C. § 112, second paragraph rejection.

in a second time less than or equal to a constant term plus the ordinal number times a

service interval to satisfy a service model; and Yang shows a "Read Sample Wheel" in

Figure 7c which depicts at least an issue pointer at element 715. This pointer is

incremented upon issuance of a read data request. Table 2 on page 3 shows various

delays involved in command processing. Therefore, each request must wait for the

previous request to issue, and that time would at least be equal to the ordinal position in

the wheel, times the service interval required for an instruction to issue. Yang does not

expressly disclose any constant term. However, Zhang teaches that certain

communications contain jitter that might throw off a service interval. See Zhang page

1375, right column. It would have been obvious to one of ordinary skill in the art at the

time the invention was made to use Yang's delays with Zhang's jitter by introducing an

extra jitter delay in order to eliminate the jitter as suggested by Zhang.

Yang does not expressly disclose: *measuring the first and second time at a*

boundary between the initiator and an interconnect. However, Zhang teaches fulfilling

service contracts as a function of time guarantees. See page 1375 section II(B). It would

have been obvious to one of ordinary skill in the art at the time the invention was made to

use Yang's timed operation with Zhang's guarantee to measure the actual time of

operation in order to determine whether or not a contract was fulfilled as suggested by

Zhang.

In regard to claim 34, the above rejection of claim 33 is incorporated. Yang does

not expressly disclose: *determining whether the arrival model and the service model*

have been satisfied in order to satisfy the QoS contract. However, Zhang teaches

determination of contract satisfaction in on page 1375 section II(B).

In regard to claim 37, the above rejection of claim 33 is incorporated. Yang does

not expressly disclose: *wherein the service interval is equal to the arrival interval.*

However, Zhang teaches bounding characterizations in order to prevent congestion. If

the arrival interval is less than the service interval, congestion occurs. See section II(C)

on page 1376. It would have been obvious to one of ordinary skill in the art at the time

the invention was made to use Yang's queue with Zhang's teaching of congestion

management in order to avoid congestion as suggested by Zhang.

In regard to claim 38, the above rejection of claim 33 is incorporated. Yang does

not expressly disclose: *determining the constant term specifically for the group of*

requests. However, Zhang teaches the specification of performance requirements before

the start of communication. See at least page 1375 section II(B). It would have been

obvious to one of ordinary skill in the art at the time the invention was made to use

Yang's queue with Zhang's performance requirements to estimate an agreed upon service

interval in order to compensate for latency variations as suggested by Zhang (see page

1375, right column).

In regard to claim 39, the above rejection of claim 38 is incorporated. Yang

further discloses: *wherein the arrival interval is a predetermined accepted interval for*

requested arrivals. See at least Table 2 on page 3 which lists various predetermined delays.

In regard to claim 40, Yang discloses:

A system, See at least Fig. 1. All further limitations have been addressed in the above rejection of claim 33 and the following rejection of claim 35 in connection with Yang.

In regard to claims 41 and 42, the above rejection of claim 40 is incorporated. All further limitations have been addressed in the above rejections of claims 36 and 38, respectively.

In regard to claim 43, the above rejection of claim 42 is incorporated. Yang further discloses: *wherein the QoS unit is coupled between the target and the interconnect.* See Figure 2.

In regard to claim 44, the above rejection of claim 40 is incorporated. All further limitations have been addressed in the above rejection of claim 35.

In regard to claims 45 and 46, the above rejection of claim 44 is incorporated. Yang does not expressly disclose: *wherein the QoS unit is part of the interconnect,* or *wherein the QoS unit is part of the target.* However, Yang teaches that separate

components can be integrated as a single component. See paragraph [0002]. It would

have been obvious to one of ordinary skill in the art at the time the invention was made to

integrate components in order to simplify communication and allow components to

operate at the same speed as suggested by Yang.

9.   Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang,

Lindeman and Zhang and further in view of prior art of record U.S. Patent Application

Publication US 2002/0129173 A1 by Weber ("Weber '02").

        In regard to claim 35, the above rejection of claim 33 is incorporated. Yang

further discloses combination of system components on a chip. See paragraph [0023].

Yang also discloses a target (see at least Fig. 1, element 103) and a QoS unit (see at least

Fig. 7c "Read Sample Wheel"). Yang, Lindeman, and Zhang do not expressly disclose:

satisfying the QoS contract using the initiator, a target, the interconnect, and a QoS unit

that are all located on a chip. However, Weber '02 teaches a system on a chip (see

paragraph [0002]. It would have been obvious to one of ordinary skill in the art at the

time the invention was made to use Yang's system components on Weber '02's system on

a chip in order to provide an efficient embedded system as is known to one of ordinary

skill in the art.

        In regard to claim 36, the above rejection of claim 35 is incorporated. Yang does

not expressly disclose: *wherein the service interval is greater than the arrival interval.*

However, Zhang teaches the concept of congestion which will occur when the servicing

of data takes longer than the arrival of data. See Section II(C) on page 1376, i.e. "Traffic

Management Algorithms." Note that Zhang teaches that congestion is common and one

of ordinary skill in the art would be motivated to avoid excessive congestion as suggested

by Zhang.

10.   Claims 47-50 and 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent 5,440,752 to Lentz et al. ("Lentz") in view of U.S. Patent 4,393,470 to Miard

("Miard").

        In regard to claim 47, Lentz discloses:

        A method for tracking service for two or more threads, comprising:

        maintaining a first allocation count for a first thread to track whether the first

thread is being serviced by a target; See column 15 line 55, i.e. "counter."

        establishing an adjustable positive limit having a first value for the first allocation

count that establishes an initial maximum amount the first allocation count may go up to;

and See column 15 line 59, i.e. "maximum value of 15." Note that Lentz discloses an

initial value for a counter which is decremented for non-service until it reaches zero.

This is logically equivalent to an initial value of zero which is incremented until it

reaches a maximum value. Therefore, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to use increments instead of decrements

since it does not change the functionality of the counter.

Lentz does not expressly disclose: *raising the adjustable positive limit for the first*
allocation count to a second value when the first value for the first allocation count has
been reached and the first thread has yet to have a request fulfilled from the target during
a regular interval of time. However, Miard teaches raising a "Maximum Attention Count
(MACT)" when a "Change State Count (CACT)" is saturated before requests are fulfilled
at a "given moment of time." See column 14 lines 15-35, i.e. "increasing the limit
MACT." It would have been obvious to one of ordinary skill in the art at the time the
invention was made to use Lentz' counter with Miard's limit increase in order to allow
additional messages from a device in an overflow situation as suggested by Miard (see
column 14 lines 17-21).

In regard to claim 48, the above rejection of claim 47 is incorporated. Lentz does
not expressly disclose: *reducing the positive limit from the second value to a third value*
for the first allocation count at a time when a second allocation count receives a credit
and is positive. However, Miard teaches reducing the limit value to a third value. See
column 14 lines 32-35. It would have been obvious to one of ordinary skill in the art at
the time the invention was made to use Lentz' counter with Miard's limit decrease in
order to suspend operation of the device thereby permitting a second device to be
serviced as suggested by Miard (see column 11 lines 9-18).

In regard to claim 49, the above rejection of claim 48 is incorporated. Lentz does
not expressly disclose: *wherein the positive limit is not reduced below the first value.*

However, Miard teaches using the LLPA instruction to adjust a MACT limit (see column 14 lines 24-36) and authorize again the transmission of messages (see column 14 lines 18-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to try reducing a limit back to a previous value in order to adjust priority levels as suggested by Lentz (see column 15 lines 57-63).

In regard to claim 50, the above rejection of claim 47 is incorporated. Lentz further discloses: *crediting the first and second allocation count at a regular interval;* See column 15 lines 54-55; Lentz does not expressly disclose: *debiting the first allocation count when the first thread is serviced; and debiting the second allocation count when a second thread is serviced; and establishing a negative limit having a fourth value for the first allocation count.* However, Lentz teaches use of a counter for each device. See column 15 lines 54-61. Lentz further teaches debiting a counter when servicing a device. See column 16 lines 1-7. This debiting occurs for a second device just as it occurs for a first device. Finally, both Lentz and Miard teach a lower limit (Lentz column 16 line 3, and Miard column 14 line 35). These lower limits are reached by applying adding negative values to the limit counters. Thus, the term "negative limit" is reasonably broadly interpreted similar to Lentz and Miard. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Lentz' credits with the further teachings of debiting and negative limits in order to prevent starvation as suggested by Lentz (see column 15 line 63).

In regard to claim 53, the above rejection of claim 50 is incorporated. Lentz further discloses: *determining whether the first thread will be serviced according to the first allocation count.* See column 15 lines 59-62.

In regard to claim 54, the above rejection of claim 53 is incorporated. Lentz further discloses: *servicing the first thread instead of the second thread when the second allocation count is less than the first allocation count.* See column 15 lines 55-63.

In regard to claim 55, the above rejection of claim 47 is incorporated. Lentz further discloses: *wherein the second thread is a high-priority thread.* See column 15 lines 55-63.

11.   Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz and Miard in view of U.S. Patent Application Publication 2002/0038397 A1 by Singh et al. ("Singh").

In regard to claim 51, the above rejection of claim 47 is incorporated. Lentz does not expressly disclose: *wherein raising comprises increasing the positive limit by an amount proportional to an allocation rate of the first thread.*   However, Singh teaches raising by a proportional amount. See Abstract, i.e. "multiple of the frequency of the bus clock." It would have been obvious to one of ordinary skill in the art at the time the

invention was made to try Miard's raising with Singh's multiple in order to provide a straightforward calculation.

In regard to claim 52, the above rejection of claim 51 is incorporated. Lentz does not expressly disclose: *wherein the amount proportional to the allocation rate of the first thread comprises a number of times the second thread was serviced by the target during the regular interval of time multiplied by the allocation rate of the first thread.* However, Singh teaches increasing throughput based on a proportional rate. See Abstract. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use It would have been obvious to one of ordinary skill in the art at the time the invention was made to try Miard's raising with Singh's multiple in order to provide a straightforward calculation.

12.   Claims 56-58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz and Miard in view Weber '02.

In regard to claim 56, the above rejection of claim 55 is incorporated. Lentz and Miard does not expressly disclose: *wherein the first thread is a bandwidth-allocation thread.* However, Weber '02 teaches bandwidth. See paragraph [0099]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Lentz' device with Weber '02's bandwidth in order to provide quality of service as suggested by Weber '02.

In regard to claim 57, Lentz discloses a system comprising *an interconnect coupled to an initiator and a target;* See Fig. 1. All further limitations have been addressed in the above rejections of claims 47 and 56.

In regard to claims 58 and 60, the above rejection of claim 57 is incorporated. All further limitations have been addressed in the above rejections of claims 47 and 56, respectively.

13.   Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz, Miard, and Weber '02 in view of Singh.

In regard to claim 59, the above rejection of claim 57 is incorporated. All further limitations have been addressed in the above rejection of claim 51.

14.   Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz, Miard, and Weber '02 in view of Yang.

In regard to claim 61, the above rejection of claim 60 is incorporated. The cited art of claim 60 does not expressly disclose the features of claim 61. However, all further limitations have been addressed in the above rejections of claims 33, 40, and 47. It would have been obvious to one of ordinary skill in the art at the time the invention was

made to use Lentz' allocation count with Yang's service model in order to provide quality

of service as suggested by Weber '02 (See paragraph [0099]).

Allowable Subject Matter

15.   Claim 62 is objected to as being dependent upon a rejected base claim, but would be

allowable if rewritten in independent form including all of the limitations of the base claim and

any intervening claims.

16.   The following is a statement of reasons for the indication of allowable subject matter:

The cited prior art taken alone or in combination fail to teach, in combination with the other

claimed limitations:

> …raise the adjustable positive limit from the first value to a second value when the first value for the first
> allocation count has been reached, then the first thread has not been service during a predetermined interval
> of time
> … wherein the fifth logic uses the first allocation count to satisfy the service model
> … wherein the arrival model is satisfied by the initiator if a request arrives before a first time less than or
> equal to an ordinal number times an arrival interval, wherein the ordinal number signifies a position of the
> request among a group of requests
> … wherein the service model is satisfied if the request is serviced before a second time less than or equal to
> a constant term plus the ordinal number times a service interval

These limitations are present in claim 62 and its base and intervening claims.

Conclusion

17.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to JAMES RUTTEN whose telephone number is (571)272-3703.

The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Tuan Q. Dam can be reached on (571)272-3695. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

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information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. Derek Rutten/
Examiner, Art Unit 2192